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RESEARCH PROJECT

State: Montana

Project No. SE-1-12 Title: Statewide Endangered Species Research

Job No. 1 Title: Northern Rocky Mountain Wolf
Investigations

Period Covered: July 1, 1985 through June 30, 1986

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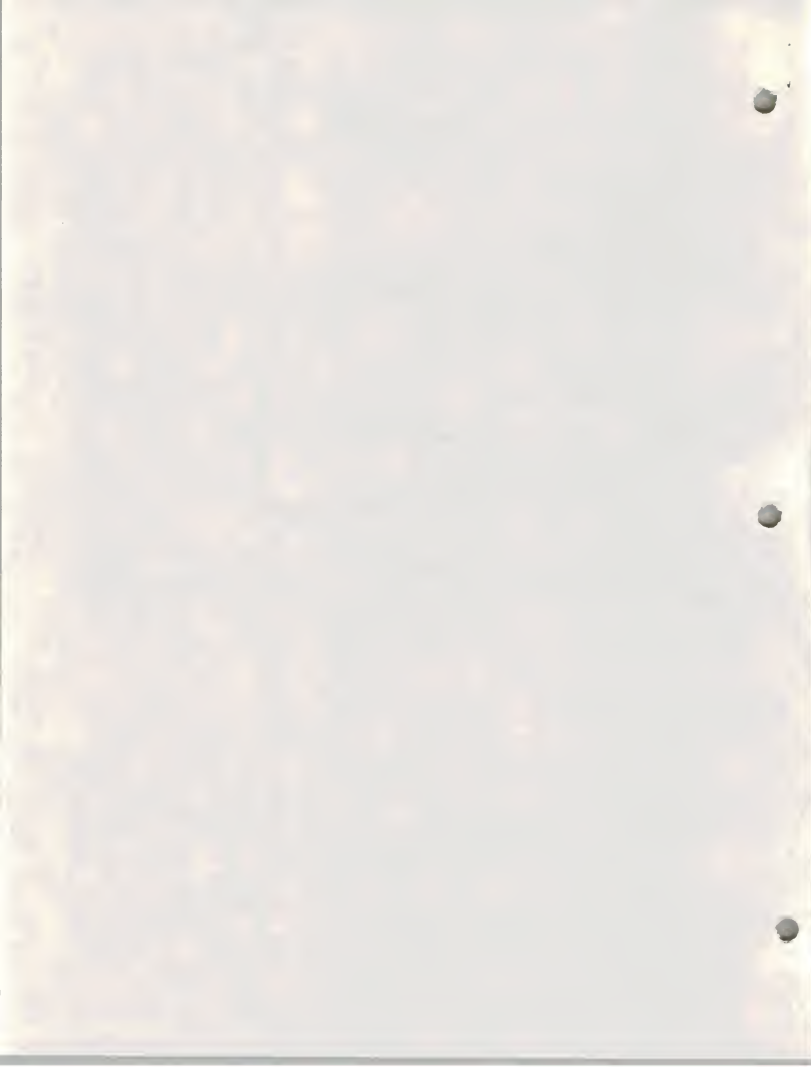
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ABSTRACT

Five wolves were trapped and radio-collared on six occasions during the report period. Two of the wolves immediately dropped their collars but a previously radio-collared wolf brought the number of wolves successfully radio-collared and tracked to four (3 females, 1 male).

In 1985, 7 wolf pups were successfully reared in the North Fork of the Flathead, British Columbia bringing the number of wolves in pack the Magic Pack to 13. One wolf, probably from this pack, was found dead from human causes in October 1985 decreasing the pack size to 12 wolves. In November 1985 this pack moved its center of activity south into Glacier National Park, Montana.

After mid-February 1986, the pack size dropped to 8 wolves. None of the 4 wolves which apparently split off from the Magic Pack wore radios and their location and welfare remains unknown. The pack remained in Glacier National Park into the breeding and denning seasons where they weaned 5 pups.

Male wolf, W8401, spent most of Summer and Fall 1985 in British Columbia but returned to Glacier National Park for Winter 1985-86. Although he was known to be with at least one other wolf as late as November 1985 and again in June 1986, he was alone throughout the winter and did not successfully breed in 1986. His Summer 1986 activity center is again British Columbia.

A random sample of 5 hairs were identified from each scat collected from the Magic Pack and W8401. Moose was the primary prey species found in Magic Pack scats from the winter of 1984-85 when the pack restricted its movements primarily to the B.C./U.S. border area and northward. White-tailed deer and elk were the secondary and tertiary prey species, respectively, represented in the Magic Pack scats from this period. After the Magic Pack shifted its home range southward into Glacier National Park, white-tailed deer, mule deer, and elk were represented in scats in that order. Moose were an insignificant portion of the Winter 1985-86 prey taken.

Most wolf reports received outside of the North Fork of the Flathead area were on the east side of Glacier National Park. The Swan/South Fork Flathead, Northwest Montana, and Middle Fork Flathead areas all had wolf reports.

1. INTRODUCTION

The Wolf Ecology Project (WEP) at the University of Montana has been studying the recovery of wolves in the northern Rocky Mountains since 1973 (Ream and Mattson, 1982). A single wolf was trapped and radio-tagged in 1979 (Ream and Mattson, 1982, Boyd, 1982), but it is only in the last few years that any wolf reproduction has taken place in this area (Ream and others, 1985). This year, for the first time in perhaps 50 years, wolves have denned in Glacier National Park (GNP).

Since July 1984, our research has been funded through Section 6 of the Endangered Species Act to the Montana Department of Fish, Wildlife, and Parks, which in turn contracted the research to the WEP. The report presented here is the second progress report prepared by the WEP for the Department. Since this was established as a 3 year study, a job completion report will be prepared one year from now, which will include data, conclusions, and recommendations for the 3 year study.

1.1 Objectives

The objectives of this study are:

1. to determine the distribution and occurrence of the Rocky Mountain wolf in northwestern Montana;
2. to determine the movements, habitat use and food habits of instrumented and observed wolves; and
3. to develop recommendations for management action necessary for wolf recovery.

1.2 Study Area

This study is being carried out in and around GNP where wolves have recently returned by natural recovery. The intensive study involving radio tagged wolves is being conducted largely in the North Fork of the Flathead River drainage, which includes the west side of GNP and the adjacent Flathead National Forest (FNF), as well as the headwaters of the river in British Columbia (BC). Wolf W8401, the first to be captured in this study, has covered most of the study area. (See Figure 2-4 for a map of the study area as well as his total home range.) This report also includes observations made outside the North Fork, but close to GNP, in order to document the progress of recovery.

The North Fork valley is level to gently rolling, varying from 2 to 6 miles in width, and surrounded by steeper foothills and rugged mountains. The wolves have mainly used the valley bottom, but travel considerable distances up and down the valley. The valley elevation is approximately 4000 feet and it is mostly forested with lodgepole pine (*Pinus contorta*). Grassy open meadows, marshes, and riparian habitats make up an important portion of the wolf locations.

The 4 most significant prey species are white-tailed deer (*Odocoileus virginianus*), mule deer (*O. hemionus*), elk (*Cervus elaphus*), and moose (*Alces alces*). These 4 differ considerably in their distribution in the study area. Because of increasing snow depths as you move north up the valley, white-tailed deer are primarily found south of Polebridge in winter, and on the south-facing slope at Kintla Lake. In summer they are found in the valley bottoms throughout the drainage. Mule deer also move down the valley in winter, using the valley around Polebridge and open ridges and steep rocky slopes elsewhere. In summer they may be found throughout the drainage but usually in the higher, more rugged portions of the area. Elk are found as far north as about 20 km north of the U.S. border in BC in the winter and may be found anywhere in the drainage in summer. In winter they use meadows and south-facing slopes in the valley itself. Moose are scattered throughout the area in both summer and winter but move to lower elevations in winter.

1.3 Materials and Methods

Wolves were trapped with modified Newhouse No. 4 steel jawed traps. Modifications included the replacement of smooth jaws with offset toothed jaws (effectively making the trap a No.14) and the replacement of the original dog/pan mechanism with a pan tension spring mechanism (M-Y Enterprises). The modified pan reduces captures of non-target species smaller than about 35 pounds. Wolves were anesthetized with a combination of ketamine hydrochloride (5.0 mg/lb) and promazine hydrochloride (1.0 mg/lb).

Captured wolves were examined, ear-tagged, weighed, measured for total length, neck circumference, canine lengths, and mammae/testes dimensions and condition, and radio-collared. Forty ml. of whole blood was taken. Six to 10 ml. of penicillin was given before release of the wolf.

Radio-collared wolves were usually located daily from the ground. Locations were determined by triangulation of at least 3 azimuths, but usually 4 or more, on 1:24,000 (7.5 minute) topographic maps in the U.S. and 1:50,000 topographic maps in Canada.

If more than two days passed that a signal could not be received on a member of the Magic Pack, a Cessna 182 was employed to aurally radio-track the wolves. Because of the remoteness of some of W8401's activity centers and the long distances that he would routinely travel, we would allow up to 7 days between locations if aerial tracking was required to locate him.

Observations and counts of wolves were normally made from the air. No attempts were made to observe wolves from the ground though on 3 occasions wolves moved within sight while ground tracking.

Wolf scats were normally collected only if they were accompanied by wolf tracks. Coyotes (*Canis latrans*) are abundant throughout the study area and dogs (*C. familiaris*) are locally common. Scats were collected without accompanying tracks if they were at a known wolf homesite as determined by radio-telemetry. Estimated date of deposition, location, estimated minimum number of wolves present and pack affiliation or lone wolf identification were recorded when possible. All scats were autoclaved and soluble material washed out. Five hairs per scat were randomly selected and identified to species if possible.

Wolf numbers and distribution throughout the study area were estimated from a combination of wolf reports (reports of wolf sightings, tracks, scats, howling, etc. that are made through the course of activities which would have occurred without the presence of a wolf research project), WEP track/howling surveys, and counts of wolves made while aurally radio-tracking.

In this report, no specific locations are presented, particularly with reference to densites. Thus Figures 2-2 and 2-3 are not superimposed on a map nor do they show any reference points. Since we are working with an endangered species, we feel it is not wise to present the data in a public document. If there is a need for such information, the authors may be contacted about it.

2. RESULTS AND DISCUSSION

2.1 Productivity, Population Size, and Distribution

2.1.1 North Fork Flathead

Throughout the winter of 1984-85, the WEP snow-tracked a pack of 5-6 wolves (the Magic Pack) in the extreme southeast corner of BC, the northwest corner of GNP, and Forest Service and private lands immediately west of the park (Ream and others, 1985). During the same period, a young adult male (W8401) was radio-tracked and snow-tracked.

Wolf reports in the North Fork from non-WEP personnel from 1 July 1985 through 30 June 1986 corresponded closely to the minimum known wolf population. The existence of wolves within the home range of the Magic Pack and W8401 was fairly well established by non-WEP wolf reports, although it appeared that without radio location information, most agency personnel and people living in the area overestimated the number of wolves in the population.

On 18 May 1985, a lactating female wolf (W8550) was captured in an Aldrich foot snare by Canadian biologist Bruce McLellan. McLellan put a radio collar on this wolf before releasing her. On 26 May 1985, W8550 was seen from the air with 7 black pups. Wolf packs typically are most cohesive during the winter and least so during the summer (Mech, 1970). The only report received of a litter of wolf pups in the North Fork was made at a rendezvous site of the Magic Pack in July 1985.

The public and agency personnel filed several wolf reports in both GNP and the FNF during the summer of 1985 when there were no radio-collared wolves in the vicinity. It is very possible that these were the exploratory movements which led to the abrupt November 1985 migration of the Magic Pack southward into the park (see Movements section).

We found the skinned and decapitated carcass of a wolf about 5 km north of the border in BC on 20 October 1985. This was during the hunting season and we discovered it by following circling ravens.

Aerial and ground observations of the Magic Pack between 11 December 1985 and 7

February 1986 indicated that the pack size was 12 wolves (Table 2-1). Prior to December, it was difficult to make good aerial observations because of weather conditions or ground cover. After 7 February, the pack size apparently dropped to 8 wolves, but included W8550 and W8551, the only two radioed wolves in the pack at that time. Because none of the 4 blackish wolves which apparently split off from the pack wore radio collars, their fate and whereabouts remains unknown. There is some speculation that they moved to the east side of GNP (see section on East Side). As snow cover decreased, the frequency and completeness of aerial counts also decreased, due to the difficulty of seeing wolves from the airplane without a contrasting background, and with new leaves obscuring them.

On about 15 April 1986, W8550 settled into a densite less than a mile from the western boundary of GNP. Because of the publicity of the event, the WEP curtailed circling flights over the Magic Pack den to avoid identifying the den location to the general public.

On a 2 July 1986 pass over a Magic Pack rendezvous site 5 gray wolf pups were observed. A 7 August 1986 flight resulted in a complete count of 8 adults and 5 gray pups.

Based upon movement data, W8401 was not involved with a successful breeding effort in either 1985 or 1986. Apparently alone during the winter of 1984-85, W8401 was seen with another wolf on 18 May 1985 in GNP. Howling at W8401 has induced a response on only 1 occasion, 13 November 1985 when two wolves responded from the direction where W8401's radio signal was originating.

Snow tracking and aerial observations throughout the winter of 1985-86, however, indicated that W8401 was a loner during this period (Table 2-2). On 26 April 1986, a Canadian bear hunter and his 2 sons reported seeing a radio-collared gray wolf with a black wolf together on a frozen pond at 0600 hours near Harvey Pass, about 25 km north of the border. At 1000 hours on the same day we made a radio-location on W8401 just 3 km west of the observation point by the hunters. Tracks of a pair of wolves heading west from Harvey Pass verified the hunter's report.

It is likely that the second wolf was a Magic Pack wolf, not an unknown wolf. Eleven days after this sighting, W8401 was at the 1986 Magic Pack densite in GNP. This strongly supports the theory that W8401 is a former Magic Pack member and the wolf accompanying him was probably also of Magic Pack origin.

Table 2-1: Visual Observations of Magic Pack, 26 May 1985 - 7 August 1986

DATE	TYPE ¹	VALUE ¹	# SEEN	REMARKS
05/26	a	Good	8	1 light adult, 7 black pups
05/31	a	Poor	1	1 light adult
07/08	a	Poor	1	1 light adult
07/15	g	Poor	4	
08/17	a	Poor	5	
09/11	a	Poor	1	1 black (W8551, collar visible)
11/13	a	Poor	3	2 black, 1 gray
11/27	a	Poor	5	
12/05	a	Poor	7	6 black, 1 gray
12/08	a	Poor	8	7 black, 1 gray
12/11	g	V.Good	12	10 black, 1 buffy (w/collar), 1 gray
12/12	g	V.Good	12	8 black, 2 charcoal, 2 light gray (1 w/ collar)
12/14	a	Good	11	9 dark, 2 light
12/31	a	Poor	6	6 black (W8550 not seen, but signal indicates close proximity)
01/02	a	Poor	10	10 black (W8550 not seen, but signal indicates close proximity)
01/07	a	V.Good	11	10 blacks, 1 gray (W8550 not seen, but signal indicates close proximity)
01/13	a	Poor	3	2 black, 1 gray
01/25	a	V.Good	12	10 black, 2 gray
02/05	a	V.Good	12	10 black, 2 gray
02/07	g	V.Good	12	10 black, 2 gray
02/11	a	Poor	5	indistinguishable
02/19	a	Poor	6	indistinguishable
02/28	a	Good	7	5 black, 2 gray
03/05	a	Poor	6	5 black, 1 gray
03/09	a	Poor	6	4 black, 2 gray
03/15	a	V.Good	8	6 black, 2 gray
03/22	a	Poor	6	5 black, 1 gray
03/25	a	Good	7	5 black, 2 gray
04/04	a	Good	7	5 black, 2 gray
04/12	a	Poor	6	6 black (W8550 not seen, but signal indicates close proximity)
04/19	a	Good	2	1 black, 1 gray
06/07	a	Good	2	1 black, 1 gray
06/16	a	Good	1	1 black
07/02	a	Good	6	1 black adult, 5 gray pups
08/07	a	V.Good	13	6 black adults, 2 gray adults, 5 gray pups

¹ See footnotes on Table 2-2.

Table 2-2: Visual Observations of W8401, 1 July 1985 - 30 June, 1986

DATE	TYPE ¹	VALUE ²	# SEEN	REMARKS
10/18	a	Good	1	
10/25	g	V.Good	1	W8401 recaptured, evidence of 1-2 wolves with him
10/30	a	Good	2	
11/13	h	V.Good	2	Not and Observation: Two wolves howling from where W8401's signal emanates. Distance to wolves about 200 m. Can receive W8401's signal w/o antennae.
12/14	a	Good	1	
01/24	g	Good	1	
02/11	a	V.Good	1	
02/19	a	Poor	1	
03/05	a	V.Good	1	
04/26	g	V.Good	2	1 black, 1 gray (w/collar). Seen by hunter 4 hrs. before W8401 radio-tracked 3 km. to the west. Pair of tracks leading west from observation point.
05/07	a	Poor	2	W8401 less than .25 miles from 1986 Magic Pack homesite.

¹TYPE: a=aerial observation; g=ground observation

²VALUE: a subjective value assigned to describe how complete the observation was in counting and describing the wolves seen. Length of observation, weather and lighting, proximity to cover and type of cover, background (e.g., against a snowy or more cryptic background), and whether the wolves were stationary or moving are factors to consider in determining value.

A minimum of 13 wolves were known to occupy the North Fork of the Flathead Valley during Winter 1985-86. This is consistent with the estimate of 6 wolves in the Magic Pack and 1 lone wolf (W8401) during Winter 1984-85, the addition of 7 pups to the pack during Spring 1985, and the known death of 1 wolf during Fall 1985. The whereabouts of the 4 wolves which apparently split from the Magic Pack during February 1986 is unknown.

The July and August 1986 sightings of 5 pups, the known survival of 8 Magic Pack

yearlings and adults, plus W8401, gives a minimum Summer 1986 wolf population of 14 in the North Fork of the Flathead. If the 4 wolves who apparently split off in February are all alive, which is not unlikely, and inhabiting the North Fork, then the minimum population would be 18 wolves.

Dr. L.D. Mech (pers. comm.) has observed a splinter group of 4 wolves leaving the core pack during March and successfully raising their own litter of pups. There remains the possibility of a second litter of pups from the splinter group. Intensive but unsuccessful howling surveys in the North Fork of the Flathead, during August 1986 however, reduces the probability that another litter exists in the North Fork.

2.1.2 Wolf Reports Outside the North Fork Flathead

Table 2-3 is a summary of all wolf reports we have received from outside the intensive study area in the North Fork of the Flathead but close to it. Wolves from the North Fork could have visited or dispersed to any of these areas. The areas are defined as follows: E. Side - Montana, east of the Continental Divide and north of Highway 200; Middle Fork - Middle Fork of the Flathead River drainage; Swan/South Fork - west of the Continental Divide, north of Highway 200, east of Highway 93, and south of the Middle/South Forks Flathead Divide; Northwest - Montana, east of Highway 93, north of Highway 200. The sections that follow discuss each of these areas.

2.1.3 East Side

Eighteen wolf occurrence reports were received for the East Side between 1 July 1985 and 30 June 1986 (Table 2-3). Ten of the reports were filed by rangers at GNP. Most reports involved 1-2 wolves.

Two independent track observations of 4-5 wolves, one by Dick and Ursula Mattson (park ranger and biologist, respectively) and another by WEP personnel, were made in mid- and late March 1986. These tracks may have been made by the 4 wolves that split from the Magic Pack the preceding month. Without radio collars, or other evidence, this cannot be proven. Notably, the locations of these two track reports, St. Mary and Two Medicine, were in areas which have consistently produced wolf reports for a number of years. It may be that the preponderance of wolf reports in these two areas are a result of the concentration of human activity around them.

Table 2-3: Wolf Occurrence Reports, 1 July 1985 to 30 June 1986

AREA ¹	DATE	TYPE	EST.#	OBS ²
E.Side	07/03	live	1	Pri
E.Side	07/13	live	1	GNP
E.Side	08/01	live	1	Pri
E.Side	08/06	live	1	Pri
E.Side	08/17	live	1	GNP
E.Side	10/02	howl	2	Pri
E.Side	10/03	track	1	Pri
E.Side	10/08	track	2	GNP
E.Side	10/17	track	1	Pri
E.Side	10/26	live	1	GNP
E.Side	12/09	track	2	GNP
E.Side	12/22	track	2+	GNP
E.Side	12/23	track	2	GNP
E.Side	12/25	track	2	GNP
E.Side	01/04	live	1	Pri
E.Side	01/05	track	2	GNP
E.Side	03/15	track	4-5	GNP
E.Side	03/36	track	4-5	GNP
Middle Fk.	09/	scat	-	Pri
Middle Fk.	10/	scat	-	Pri
Swan	10/13	live	1	Pri
Swan	10/27	tracks	1	Pri
Swan	11/01	tracks	1	Pri
Swan	11/??	live	3	Pri
Swan	11/06	track	3	Pri
Swan	01/13	live	1	Pri
Swan	02/05	live	2	Pri
NW	10/06	tracks	1	USFS
NW	12/25	live	4	Pri
NW	12/28	tracks	2	USFS
NW	12/31	live	1	USFS
NW	01/07	live	1	USFS & Pri

¹AREA: See text above for area definition.

²OBS: observed by private party (pri), Glacier National Park employee (gnp), U.S. Forest Service employee (usfs), Wolf Ecology Project employee (wep).

The wolf population on the East Side is probably only 2-6 animals. This does not include any pups which may have been produced during 1986.

2.1.4 Middle Fork Flathead

Only two wolf reports were filed for the report period in the Middle Fork area. Both of these reports were of wolf scats, the least conclusive of wolf sign because of the high potential for confusion with coyote and mountain lion scats. The scats were both 35 mm. at greatest diameter and full of hair. Weaver (Weaver, 1979) found that 99% of the Wyoming coyote scats measured were less than 30 mm. diameter but only 33% of Minnesota wolf scats were greater than 30 mm. in diameter. So, the fact that a scat is less than 30 mm. does not mean that it is not wolf, but if it is greater than 30 mm., it probably is not coyote. Mountain lion scats are typically not as full of hair, are twisted, and have a "tail" at the end.

There have been some undocumented reports from Middle Fork residents who have observed a lone wolf over the past several years but are unwilling to discuss their experiences with inquiring biologists.

There were no indications of pack activity in the Middle Fork during the report period.

2.1.5 Swan Range

There were 7 reports of wolves in the Swan range during the report period (Table 2-3). Unlike the East Side reports, most of the Swan visuals, 2 of 3, involved more than 1 wolf (versus 0 of 7 visuals on the East Side).

2.1.6 Northwest Montana

Five wolf occurrence reports were received for this area during the report period, but not consistently from one area.

2.2 Mortality

An anonymous informant phoned the Flathead County Attorney's office in Kalispell, in late June 1986 to report a wolf that his friends had supposedly shot, probably in the Moose Creek drainage of the North Fork of the Flathead. This report was never verified by a carcass, despite a search. The only documented wolf mortality occurred in the North

Fork of the Flathead where a wolf carcass was found on 20 October 1985 about 5 km north of the border. The carcass was left undisturbed for BC game wardens to examine. No data on age or sex have been obtained.

It is possible that there had been some pup mortality before our initial pup counts of 7 on 26 May in 1985 and 5 on 2 July in 1986. Nevertheless, the pup survivorship for the Summer 1985 to late Winter 1986 period was 100%. July - August 1986 pup survivorship was also 100%.

Adult survivorship has been almost as good. There were probably 6 wolves in the Magic Pack during Winter 1984-85 (as estimated from snow-tracking). Seven pups were known to have been recruited into the Winter 1986 pack and 1 wolf was known to have been killed in the Magic Pack home range. This adds to 12 wolves in the Magic Pack, the known size of the pack during Winter 1986. Magic Pack adults had 83% (5 of 6) survivorship during the 15 month period of November 1985 to February 1986. We cannot positively account for the wolf or wolves which sporadically have accompanied W8401 for the 2 years that he has been collared, nor is mortality of unradioed emigrants into the study known.

The prevailing conditions in the Magic Pack's home range would promote excellent survivorship. The 4 prominent sources of wolf mortality are interpack strife, disease, food stress, and human induced mortality ((Mech, 1970), (Fritts, 1981), (Peterson, 1984)).

Because of the lack of adjacent packs, interpack strife is not a source of mortality for the Magic Pack at this time.

Disease is probably unimportant at this time. Six recently deposited (< 24 hrs. old) wolf scats were collected from the Magic Pack in August 1985. These scats were sent to the Montana State Veterinary Lab in Bozeman to assay for canine parvovirus (CPV). The results for 4 pup and 2 non-pup scats (as determined by accompanying tracks in the mud and scat diameter) were negative for CPV. Blood serum samples were taken on captured wolves for disease and nutritional profiles. The results from these samples have not yet been received from the lab.

Based on the condition and weights of 3 Magic Pack pups captured in September 1985, food stress has not influenced survivorship for the past several years.

Another probable contributing factor to the high survivorship of North Fork wolves at this time is the age structure of the population. There may be no wolves in the population that are older than 5 years.

2.3 Wolf Distribution, Movements, and Home Ranges

2.3.1 Radio History

Both wolves (W8401 and W8550) with radio collars at the beginning of the report period (1 July 1985), continued to transmit through the reporting period. W8401 was recaptured on 25 October 1985 and fitted with a new collar. Three wolf pups were captured in September, 1985, but 2 of these slipped their collars shortly after capture and provided no useful location data. The remaining female pup (W8551), now a yearling, was recaptured on 22 May 1986 and fitted with a new collar. Another female wolf (W8653) was captured and radio collared on 28 May 1986, providing only one month's location data in this report period. Table 2-4 summarizes the radio history of the captured wolves for this report period. All wolves with radios during this period were part of the Magic Pack except W8401. As discussed earlier, he was a lone wolf most of the time. The large number of locations for W8550 represent intensive monitoring during the denning and rendezvous season. W8401 was located about once per week during the summer.

2.3.2 Wolf W8550 and the Magic Pack

W8550, the alpha female of the Magic Pack, was radiotracked for the entire fiscal year. At the beginning of this report period, July 1, she was at the den/rendezvous site where she had whelped (Figure 2-1). On 26 May 1985, she had been observed with 7 pups in an open meadow in the same area. All 7 pups in her litter were black in color. On 1 August, she crossed the North Fork with the pups and spent the next 9 weeks west of the river. On 7 and 9 September, 3 pups were captured and radio collared. Two subsequently slipped their collars.

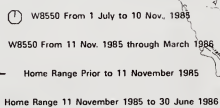
The big game hunting season started in BC on 11 September, and the North Fork Flathead received considerable hunting pressure. There was also a lot human activity associated with oil and gas exploration and logging during September and October. Through October the 7 new pups were traveling with the previous 6 members of the Magic Pack. On 20 October one wolf in this pack of 13 was illegally shot and the hide

Table 2-4: Radio Locations From 1 July 1985 to 30 June 1986
and Weight in Pounds at Time of Capture

Wolf	Sex	Born	Captured	Wt	Recaptured	Wt.	# Locations
W8401	M	1982?	8/28/84	105	10/25/85	100	117
W8502	M	1985	9/7/85	65			0
W8550	F	1982?	5/18/85	--			350
W8551	F	1985	9/9/85	48	5/22/86	75	214
W8552	F	1985	9/9/85	62			3
W8653	F	1984?	5/28/86	96			35

removed, presumably by a hunter in the area. On 10 November the remaining 12 members of the Magic Pack left Canada and moved into GNP, where they were found the following day about 3 km south of the Canadian border (Figure 2-1).

Throughout the remainder of the winter and spring, the Magic Pack remained in GNP, with only 2 locations on W8550 at the border and 1 location 6 km north of the border prior to 4 April. From 4 April to 9 April, W8550 was north of the border and on 5 April was near her 1985 densite. On 12 April she was 50 km south of her 9 April location, and 40 km south of the border. On 13 April she had moved 16 km back to the north, and by 17 April another 6 km to her 1986 densite. Thus, W8550's 1986 densite was nearly 30 km south of her 1985 densite. Her entire home range after 10 November 1985 had also shifted south of the Canadian border. Nearly all of her locations between 18 May 1985, when she was captured, and 10 November, were north of the border. Although we had no radio collar in the Magic Pack the previous winter, we did a lot of tracking of this pack in the snow, nearly all of it north of the border. There is no doubt that we witnessed a major shift in home range of the Magic Pack on 10 November (Figure 2-1). Movements during the denning season are discussed in a section of the report that follows.



**Figure 2-1: Locations and Home Ranges for W8550
1 July 1985 to 31 March 1986**

2.3.3 Wolves W8551 and W8653

Wolf 8551, from the 1985 litter of pups, stayed very close to her mother, W8550, from 9 September when she was captured right up to the 1986 denning season. Since her locations were essentially identical to her mother's, no separate map is presented here. After W8550 denned, in mid-April, 1986, W8551 moved in a pattern different than her mother, and this is discussed in the following section. W8653 was captured on 28 May 1986, and only provided data for one month of this report period. During that time she remained tightly associated with the Magic Pack.

2.3.4 Denning Season Movements of W8550 and Magic Pack

Although W8550 moved about very freely prior to 17 April, starting on that date she remained at or very close to the densite for the next 5 weeks (Figure 2-2). At 0615 am on 15 May, W8550 was 5 km from the densite where she had been at 1640 the previous evening and by 1830 on 15 May she was back at the densite. This is the only time during the first 5 weeks that she was located more than 1 km from the densite. For the following 5 weeks, 22 May to 30 June, she travelled away from the den for greater and greater distances but always returned within 24 hours. At 0755 on 30 May she was 21 km south of the densite but by 1730 that evening she had returned. On 16 June W8550 was 27 km northwest of the densite, and on 17 June she was still 17 km away, but by 18 June she was back at the densite. This was the furthest she traveled from the densite during the 10 weeks illustrated in Figure 2-2. Densite in this discussion refers to the dens and associated rendezvous areas, which we subsequently found to all be within a .1 km² area.

Wolf W8551, a yearling female in the 1986 denning season, was also very faithful to the densite during this 10 week denning period (Figure 2-3). However, W8551 was not necessarily present at the site at the same time as W8550, particularly during the first 5 weeks. Her trips from the densite during this time were more frequent than W8550, and of greater distance and duration. During the next 5 weeks (after 21 May), she stayed closer to the densite than W8550. Only once between 22 May and 30 June was she more than 3 km from the densite. On 16 June, W8551 was 20 km northwest of the densite (W8550 was 27 km northwest at the same time) and 2 days later she was back at the densite. W8551 was recaptured and her radio replaced on 21 May, and this could be part of the reason she subsequently stayed close to the densite. However, we do not believe she

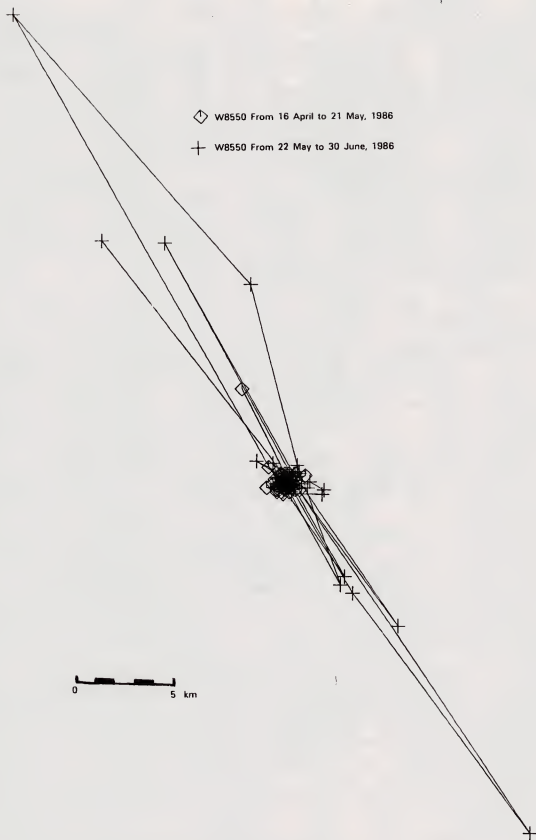


Figure 2-2: Locations of W8550 During Denning Period

had injuries from trapping that would have warranted her staying at the densite. Even the last 2 weeks of June, she never was found more than 3 km from the densite. Other wolves captured have not stayed so close to one place following their capture. W8653, captured on 28 May, moved around more than W8551 following her capture.

We were able to monitor densite attendance by radiotracking the 3 radio-collared female wolves, W8551, W8653, and W8551, the alpha female. Most of the time at least 2 of the 3 were present, often all 3. On 16 and 17 of June, when W8550 and W8551 were a long distance from the densite, W8653 was present at the densite. Besides the 3 radiotagged wolves, there were at least 5 other yearling or adult wolves in the pack that could have been participating in densite attendance.

2.3.5 Wolf W8401

Wolf W8401, a lone male, continued to cover a large portion of the study area in his movements during the past year (Figure 2-4). He continued to spend most of the summer at the headwaters of the North Fork in British Columbia, but on 31 July 1985, and again on 4 September, he was located across the continental divide in Alberta. As in the previous year, W8401 continued to make some long distance movements in a short period of time. On 11 September he was 40 km north of the U.S. border near the North Fork and 9 days later he was 92 km south of that location, near the Camas Creek entrance to GNP, where he stayed 5 days before returning to Canada. On 16 October, W8401 was 18 km north of the U.S. border and 2 days later he was 59 km south, again in GNP. Although he spent most of the winter in GNP, W8401 made several short trips north into Canada. On 1 March 1986, he was close to the border in GNP and 3 days later he was 49 km north where he stayed for 4 days.

Figure 2-4 presents the locations for W8401 for 3 separate time periods; summer-fall, winter, and spring. The dates used in this figure are consistent with those selected for the Magic Pack, as represented by W8550. W8401 was the first wolf to establish a winter home range in GNP in 1984-85. When the Magic Pack moved down into GNP on Nov.10, 1985, they established their home range in the same area as W8401 had used the previous winter. W8401 however, did not abandon his former winter range, but used portions of it that the Magic Pack was not using on a given day. It was apparent that when the Magic Pack moved into a meadow that W8401 had been using for several days,

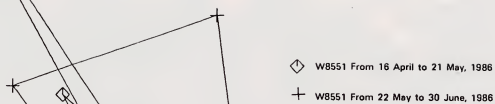


Figure 2-3: Locations of W8551 During Denning Period



Figure 2-4: Locations of W8401 From 1 July 1985 to 30 June 1986
Home Range From 28 August 1984 to 30 June 1986

W8401 would move to a different portion of the winter range, sometimes 20-25 km in one night. During the breeding season, in February, W8401 was often found very close, sometimes less than 1 km, to the Magic Pack. He apparently was unable to attract a mate, and by late March appeared to be avoiding the Magic Pack again.

2.4 Food Habits

Food habits of wolves in the study area were determined through scat analysis. Scats were only collected if they were positively associated with wolf tracks or if they were at the summer den or rendezvous site. Scats were autoclaved, washed, and 8-10 hairs picked at random from the scat and mounted on microscope slides. The first 5 hairs on each slide were identified. This gave us a sample of 5 hairs selected at random from each scat collected. The data presented in this progress report include a number of hairs identified only as "Deer spp.", Cervidae, or unknown, and as such these results should only be considered tentative. We will sample additional hairs in scats that had those and try to eliminate all unknown and Cervidae categories, and reduce the "Deer spp." numbers. We feel that more work needs to be done on technique for analyzing hairs in wolf scats. We think, at this point in time, that the procedure we are using is better than visually separating the hair contents into piles of hairs that "look similar" and trying to quantify results in that manner. Table 2-5 presents the results for all scats analyzed to date, with total numbers of hairs found for each prey species.

Deer make up an important portion of the prey base in both winter and summer, with white-tailed deer predominating. There were dramatic differences between the first winter (84-85) and the following summer and the following winter (85-86) in terms of moose hairs found. There are very few deer north of Polebridge in winter, but that is where the Magic Pack spent the winter in 1984-85, mostly north of the Canadian border to the best of our knowledge. Thus the Magic Pack seemed to rely more on Moose as a prey species that winter than they did last winter. Wolf W8401 spent the 1984-85 winter in GNP and most of the white-tailed deer hairs in that winter's sample were from W8401. Wolf hairs in the scats undoubtedly represent hairs ingested during grooming. Based on subjective field observations, we anticipated a greater number of elk hairs in the sample. Some identified as Cervidae in this preliminary analysis may turn out to be elk when further hairs are sampled. The 2 horse hairs in the sample were from 1 scat collected on April 1, 1985. An outfitter had a dead horse earlier and some wolves were known to have visited the carcass.

Table 2-5: Total Hairs Identified in Wolf Scats

	<u>Sept.84-April 85</u>	<u>Summer 85-Densite</u>	<u>Sept.85-April 86</u>
	%	%	%
Moose	25.0	1.4	0.3
Elk	5.9	5.3	9.8
White-tailed Deer	15.3	7.7	17.5
Mule Deer	3.0	2.4	11.7
Deer spp.	20.6	28.7	34.0
Cervidae	8.1	15.8	5.5
Mountain Goat	-	-	0.7
Wolf	9.7	6.7	5.8
Coyote	0.4	2.4	0.8
Black Bear	-	1.0	-
Marten	-	-	1.0
Hare	1.9	-	1.0
Porcupine	-	6.2	-
Beaver	-	2.9	-
Other Rodent	1.7	0.5	-
Horse	0.4	-	-
Unknown	8.1	19.1	12.0
Total Hairs	<u>475</u>	<u>210</u>	<u>730</u>

2.5 Summary and Management Implications

Wolves in the North Fork Study area appear to be progressing towards recovery fairly rapidly, but there is still only one major pack in the area. With the litter of 7 pups born to the Magic Pack in 1985 and another litter of 5 pups born in 1986, there is currently a minimum of either 18 wolves in the North Fork, or 14 in the North Fork and 4 elsewhere (perhaps the east side of GNP). We currently have radio collars on 3 females in the Magic Pack and a lone male that uses the entire North Fork area as his home range. One wolf in the Magic Pack was illegally killed in BC in October, 1985. That is the only known mortality, although one other wolf was reported to have been shot on the U.S. side of the border in the North Fork. The wolves appear healthy, there is rapid growth in the young, and they attain large size and weight. We feel that natural mortality will be very low in the near future. The major source of wolf mortality will probably continue to be human-induced. If the major portion of the wolf population continues to use GNP, this will help to reduce human-caused mortality, because there is no legal hunting or trapping in the park.

A substantial shift in home range of the Magic Pack occurred in November 1985, when the pack shifted its entire home range from north of the Canadian border southward into GNP. Only 3 locations out of 96 after 11 November 1985 and before denning (15 April 1986), overlapped the 117 locations prior to 11 November (1 July to 10 November 1985). Even those 3 were close to the boundary of the 2 home ranges (Figure 2-1). There was no overlap during the denning season (15 April to 30 June).

The densite was again located in the valley bottom near open meadows, but on the U.S. side of the border in GNP this year. Although GNP offered more protection to a densite, than areas outside the park, the densite selected by the wolves was within 1 km of the public road that goes from Polebridge to Kintla Lake in the park. At denning time this road was still closed from the winter. Following discussions with the subdistrict ranger and park headquarters, a decision was made by the ranger to keep the road closed until late May and keep the area on the den side of the road closed for public use for another month after that. Since this was the first den in GNP and in the western U.S., for perhaps 50 years, we feel that this was a wise decision. In future years, we anticipate there will be more than 1 den and the necessity for closure will be minimal, depending on the particular den situation.

We believe that wolves have had relatively little impact on the prey population in the area so far. Most prey animals taken by wolves last winter were taken in GNP. Although it is very difficult to estimate rate of kill, we feel that about 2 to 3 deer per week, or the biomass equivalent of other prey, were taken by the 12 wolves in the Magic Pack last winter. With the help of Dr. Dan Pletscher, and 2 graduate assistants, we initiated a study of white-tailed deer last winter to collect baseline data on the deer population. A brief progress report on this research is included in the Appendix of this report.

Additional trapping will be conducted in autumn 1986 and again in spring of 1987 if necessary. We would like to capture 4 additional adults or subadults and 4 pups, so that we are better able to document dispersal as it occurs, and determine what areas any dispersers settle in. In addition, if we can locate the 4 wolves that apparently left the Magic Pack last spring, whether they are on the east side of GNP or elsewhere, we would like to radio collar them and/or their pups.

GNP and the Flathead National Forest have jointly adopted a computer-based Geographic Information System that will be used during the coming year with our wolf location data to determine any patterns of habitat use. Besides radio location data, we have plotted routes of travel, through winter tracking, on plastic overlays to topographic maps. This data will also be used to determine patterns of use on the landscape. We know from last winter's tracking, that wolves consistently use the same or similar routes of travel through the winter and that these routes often followed benches and/or meadows as the pack traveled up and down the North Fork valley.

Finally, the WEP has adopted a research advisory committee, and has put considerable effort into planning future studies that are needed, to monitor and conduct research on wolf recovery. A major prospectus is being developed that will outline the studies that are needed to assure that all facets of wolf recovery are adequately addressed. Wayne Brewster, U.S. Fish & Wildlife Service; Cliff Martinka, GNP; Bill Ruediger, U.S. Forest Service; Bart O'Gara, Montana Cooperative Wildlife Research Unit; and Dan Pletscher, School of Forestry, University of Montana have served on this committee and Dave Mech has provided technical assistance.

2.6 Acknowledgements

A number of volunteers have worked on the project and contributed a great deal to its success during the past year. The following worked in the field for at least 3 months: Russ Beuch, Andrea Blakesley, Pam Broussard, Joe Butler, Bill Falvey, Ann Henry, Jamie Jonkel, Doug McAlester, Andrea Peterson, and Denise Roth. We would also like to thank the following individuals for helping with our logistics in carrying out this work: Jerry DeSanto, Sharon Fairchild, Jody and Vicki Jackson, Ursula and Dick Mattson, Johnny McBride, Niel, Shari, and Tracy Normandeau, Bill and Carol Stewart, and George Ostrom and the Moose City Corporation. Their help has been invaluable.

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I. McIntire-Stennis Progress Report - White-tailed Deer Study

**Relationships Between White-tailed Deer Habitat Use,
Forest Management Practices, and Wolf Recovery**

Submitted by:
Dr. Daniel H. Pletscher
Dr. Robert R. Ream

May 12, 1986

We have made significant progress on our project since its inception less than one year ago. Two graduate students have been selected; one (Patricia Tucker) has been working since last October and the second (Rod Krahmer) will be starting this summer.

A hunter check station was run on the North Fork Road during the 1985 big game hunting season, and 48 white-tailed deer were checked. A tooth was pulled from each adult for age determination and the later construction of a life table. In addition, sex, hindfoot length, antler beam diameter, and diastema length were recorded.

The Big Creek winter range for white-tailed deer was selected as the intensive study area. Winter trapping occurred for 11 days between 14 January and 5 February. A total of 38 deer were captured; of these, 12 adult does were fitted with color-coded radio collars and released. Other trapped deer (males and fawns) were marked with ear tags and released. Animals were relocated by telemetry 225 times between 5 February and 30 March (an average of 19 locations per animal). Tracking was done primarily from the ground but, when necessary, from an airplane.

Visual sightings of marked and unmarked deer were also recorded. An estimate of productivity was made by classifying all deer sighted as fawns or adults.

All the radioed white-tailed deer moved off the winter range between 3 March and 20 April. All of the animals were still alive as of 1 May and had set up spring ranges within Glacier National Park. The maximum straight-line distance between spring/summer and winter ranges was about 12 km.

Habitat use will be assessed by overlaying deer locations on habitat maps. Pellet group counts and track transects will also be used to determine habitat use on a more extensive study area.

Plans for 1986-87

The remaining 8 radio collars will be fitted on female deer this summer. The telemetered deer will be located throughout the year from the ground and, when necessary, from an airplane. Coordination with the Wolf Ecology Project on obtaining locations will continue to occur in order to minimize flying time. A hunter check station will again be run during the fall. Pellet group plots will be set up within the study area this summer, will be cleared in the fall, and habitat use will be determined following snow melt. Track transects will be run during winter as will doe/fawn classification counts. Rod Krahmer will have his study plan prepared by the end of his second quarter here.

